

00/10/80
JG699 U.S. PRO

PATENT
Docket No. RSW9-2000-0094-US1

Express Mail No. EL592132732US

JG625 U.S. PRO
09/628399
08/01/00

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

INVENTOR(S): David A. Selby
APPLICATION NO. Not Yet Assigned
FILED: Herewith
TITLE: METHOD AND SYSTEM FOR MANAGEMENT OF
A WAIT LIST FOR RESERVED PURCHASES

CERTIFICATE OF EXPRESS MAILING

I hereby certify that this correspondence, along with any papers indicated as being enclosed, are being deposited as Express Mail, (Label No. EL592132732US), postage prepaid, in an envelope addressed to: Box Patent Application, Commissioner for Patents, Washington, D.C. 20231, on August 1, 2000.

Lynn M. White
Lynn M. White

BOX PATENT APPLICATION
Commissioner for Patents
Washington, DC 20231

NEW APPLICATION TRANSMITTAL LETTER

Sir:

Enclosed are the following papers relating to the above-named new application for patent:

1. Specification (25 pgs.), claims (8 pgs.) and abstract (1 pg.);
2. Drawings (5 sheets) **informal**;
3. Declaration and Power of Attorney (**executed**); and
4. Assignment Recordation Form Cover Sheet (in duplicate) and executed Assignment.

CLAIMS AS FILED				
	No. Filed	No. Extra	Rate	Calculations
Total Claims	27 - 20 =	7	\$18	\$126.00
Independent Claims	3 - 3 =	0	\$78	\$0.00
Multiple Dependent Claim(s), if applicable			\$260 =	\$0
Basic Filing Fee				\$690.00
			Total Fee:	\$816.00

Please file the application and charge **International Business Machines (IBM) Account No. 50-0629** the amount of **\$856.00** to cover the filing (\$816.00) and Assignment recordal (\$40.00) fees. Two copies of this letter are enclosed. In the event of non-payment or improper payment of a required fee, the Commissioner is authorized to charge or to credit **Deposit Account No. 50-0629** as required to correct the error.

Please address all correspondence to:

Mark D. Simpson, Esquire
 Synnestvedt & Lechner
 2600 Aramark Tower
 1101 Market Street
 Philadelphia, PA 19107-2950

Telephone calls should be directed to the undersigned at (215) 923-4466.

Respectfully submitted,

8/1/00
 Date



Mark D. Simpson
 Registration No. 32,942
 Attorney for Applicant
 International Business Machines Corporation

**METHOD AND SYSTEM FOR MANAGEMENT OF
A WAIT LIST FOR RESERVED PURCHASES**

Background of the Invention

Field of the Invention

This invention relates generally to purchasing and reservation systems and, in particular, the present invention relates to improvement of yield management with respect to ranking of reservations that are on a "wait list" for the purchase of perishable commodities such as airline seats, hotel rooms and the like.

Description of the Related Art

Common carriers such as commercial buses, trains, and airlines, and service industries such as hotels and rental car companies, face complex issues when conducting strategic and operational planning. Businesses of this type deal with "perishable commodities" which are defined as commodities that cannot be inventoried and share three common characteristics: perishability, "fixed" capacity, and segmentability. Perishability means that each commodity ages or becomes unavailable, and thus has no value, after a certain date, time or similar temporal event. "Fixed" capacity implies a high cost of adding an incremental unit such that capacity is regarded as static and unchanging. Segmentability refers to the ability to segment customers based on a willingness to pay using different rates and/or different purchase restrictions, such as the date of purchase

relative to the date of use. Examples of perishable resources include airline seats, hotel room nights, rental car days and similar products or services such as described in L. R. Weatherford & S. E. Bodily, A Taxonomy and Research Overview of Perishable-Asset Revenue Management: Yield Management, Overbooking, and Pricing, 40 Operations Research 5, pp. 831-44 (1992), the disclosure of which is incorporated herein by reference.

Organizations marketing and selling perishable commodities spend numerous hours trying to choreograph the interrelated elements of scheduling, routing, and crew/staff rotations while maximizing profits and efficiency. Maximum profits are achieved when all of the available perishable commodities (e.g., with respect to airlines, all seats on a given flight) are sold on the perishing date (e.g., with respect to airlines, at the time the given flight departs). Maximum customer satisfaction occurs when perishable commodities reserved by consumers are available on the perishing date. The marketer/seller of perishable commodities must therefore constantly balance these two competing interests so that all of the commodities are sold and are available for all those who reserved them.

The terms "revenue management" and "yield management" are now common terms in service industry parlance to describe the use of statistical analysis to manage itinerary control, inventory control, over-booking and pricing so as to increase the revenue yield per unit of available capacity. Based on the statistical analysis, forecasting, optimization

models, and the like, determinations are made as to which reservation requests to accept and which to reject in order to maximize revenues.

The airline industry presents a typical example of a service industry which utilizes yield management techniques to try to maximize profits while coping with the complicated operational issues inherent to the industry. An airline passenger may have five or more carriers to choose from when planning a trip from point A to point B. Airlines are constantly seeking ways to maximize their efficiency and profits and make tremendous efforts to win and maintain customer loyalty. Airline passengers' primary criteria in selecting airlines include safety, comfort, and timeliness. Given the relatively wide selection of carriers available to airline passengers, and the ease with which reservations can be made and changed, a failure in any of these areas by an airline is likely to result in a migration of passengers to other airlines.

It is a well-known practice in the airline industry to overbook flights in an attempt to assure that the flights are fully loaded with passengers, thereby maximizing the profits for the airlines. The policy of overbooking is based upon practical considerations. For various reasons, not all flights reserved are actually purchased, i.e., while they may have been reserved, they do not actually "materialize". For example, air travelers frequently reserve seats which they have no intention of using so that they may be assured of having the most convenient itinerary possible. Take, for example, an air passenger who is based in Philadelphia and needs to be in London, England on a particular Tuesday by 1 p.m.

20

4

While providing convenience for the air passenger, such reservation practices make it particularly difficult for airlines to assure that all flights depart without empty seats. To

compensate for unmaterialized reservations, airlines have adopted the policy of overbooking flights with the understanding that a certain percentage of the seats on "reserved" status by passengers will never actually materialize. In a perfect world, the airlines could always tell with precision precisely how many passengers would over-reserve for a particular flight and would then overbook for that flight by the exact number so that all seats would be filled. In reality, however, it is impossible to predict precisely how many reservations will not materialize; thus, airlines frequently end up with either too few seats sold, thereby losing revenues by flying aircraft with empty seats, or too many seats sold, requiring the airlines to "bump" passengers onto the next available flight to their destination. While most airlines will in some manner compensate passengers that have been bumped, for example, by providing them with vouchers good towards future flights on the airline, free hotel accommodations, and the like, such a practice, is costly for the airlines, is usually extremely inconvenient to the airline traveler, and can lead to once-loyal passengers migrating to a competitor airline.

In an attempt to overcome the above problems, systems have been developed which track the frequency with which a particular flight experiences overbooking or underbooking and, based on this statistical analysis, increases the point at which that particular flight is considered "closed" to a number greater than 100% of the capacity of the aircraft, with the exact percentage greater than 100% being based upon the historical data for that flight. Examples of such systems can be found in, for example, U.S. Patent

No. 5,918,209 to Campbell et al., U.S. Patent No. 5,255,184 to Hornick et al., and U.S. Patent No. 4,775,936 to Jung, all of which are incorporated fully herein by reference.

Each of the prior art systems known to the applicant involve statistical analysis of the perishable commodity in question (e.g., the particular flight, airline seat, hotel room, rental car) to determine the history of booking with respect to the perishable commodity over a period of time. Thus, for example, a particular flight (e.g., Flight Number 250 from Philadelphia to London) and/or combination of legs comprising an entire itinerary, might be analyzed to determine the likelihood that the particular flight(s) will be fully sold out, based on the overall past history of overbooking or underbooking for the flight(s). Additional factors considered by the prior art systems may include whether or not a particular event is associated with the flight (e.g., did a particular flight experience different sales characteristics when the flight was associated with travel to and from the Olympic Games?), or whether any sales promotions are associated with the flight (e.g., was it necessary to offer discounted fares in order to fill up the seats?). While the use of such systems provides assistance to the airlines, their focus is always on very general statistical history of a specific booking itself, and guesses regarding the impact of outside factors such as event association or promotional fare structures.

None of the prior art systems analyze: details of the individual *reservations* so that the *reservations* can be characterized as having one or more traits; characteristics of the consumers who reserve the bookings so that the consumers (or potential consumers) can

be characterized as having one or more traits; or the reasons why the person making the reservation actually did (or did not) purchase the reserved booking. The Applicant has determined, however, that it is only by understanding why a particular booking actually materializes that better prediction models can be developed so as to optimize the yield management or revenue management system. If the details of the booking (other than simply the flight number) and characteristics of the persons making the reservations were to be factored into the analysis, the effectiveness of the overbooking policy by the airlines could be increased. However, none of the prior art systems attempt to make such an analysis.

In addition, none of the prior art systems adequately address the optimization of promoting potential purchasers in a "wait list" from "wait-listed" status to reserved status. Once the available reservations for a particular perishable commodity are considered closed (e.g., all seats for a particular airline flight or all rooms for a particular hotel on a given date are considered sold) it is a common practice for the seller of the commodity to compile a list, usually referred to as a "wait list," of potential purchasers who may still be interested in purchasing the perishable commodity in the event that one or more of the reservations becomes available due to, for example, cancellations of current reservations. Potential purchasers who are "wait listed" typically are under no commitment to purchase the canceled reservations when they become available. Often the wait listed purchasers choose to or are compelled to make alternative reservations in order to satisfy their need

for the reservation in the first place, and this information may not be conveyed back to the organization keeping the wait list, resulting in listings on the wait list which are invalid (i.e., although they are on the wait list, they will never choose to purchase the canceled reservation because they have made an alternative commitment).

5 It is to the benefit of the seller of the perishable commodity to promote potential purchasers from the wait list to a reserved status based on the likelihood that the promotee will actually accept the promotion, i.e., agree to purchase the canceled reservation. The current practice of wait-list promotion is based purely on the skill and judgement of the person charged with making the promotion (e.g., in the context of airline ticket sales, the route controller). While certain individuals may have a better feel for who to promote and
10 who not to promote, often success is based as much on luck as it is on skill.

 Accordingly, it would be desirable to have a method and system for promoting wait-listed individuals from a wait-list status to a reserved status which is based on statistical analysis and the likelihood that, if promoted, the reservation will actually materialize, so
15 that those wait-listed reservations that are more likely to materialize will be given the first opportunity to move from a wait list status to a reserved status.

Summary of the Invention

 It is therefore an object of the invention to provide a system and method for predicting the likelihood of materialization of pending wait-listed reservations for the

purchase of perishable commodities, which system and method provides for the gathering and analysis of details pertaining to perishable commodities for which reservations for purchase have been made in the past, gathering and analysis of details pertaining to perishable commodities for which reservations for purchase are currently pending but closed, and determining, based upon the analysis, the likelihood that a particular wait-listed pending reservation will actually be purchased or "materialize" if promoted from a wait list status to a reserved status.

In a first embodiment of the present invention, the present invention comprises a method for materialization forecasting with respect to wait-listed reservations made by persons for the potential purchase of perishable commodities, comprising the steps of: gathering past reservation information relating to past reservations for perishable commodities that have already perished, gathering wait list reservation information relating to wait-listed reservations for perishable commodities that have not yet perished, comparing the past reservation information and the wait list reservation information, calculating, based on the comparison, the likelihood that the wait-listed reservations will materialize if promoted to reserved status, ordering the wait-listed reservations based on their likelihood of materialization; and outputting the ordered wait-listed reservations.

In a second embodiment of the present invention, the invention comprises computer-readable code stored on media for conducting materialization forecasting with respect to wait-listed reservations made by persons for the potential purchase of perishable

commodities, comprising first subprocesses for gathering past reservation information relating to past reservations for perishable commodities that have already perished, second subprocesses for gathering wait list reservation information relating to wait-listed reservations for perishable commodities that have not yet perished, third subprocesses for
5 comparing the past reservation information and the wait list reservation information, fourth subprocesses for calculating, based on the comparison, the likelihood that the wait-listed reservations will materialize if promoted to reserved status, fifth subprocesses for ordering the wait-listed reservations based on their likelihood of materialization, and sixth subprocesses for outputting the ordered wait-listed reservations.

Brief Description of the Drawings

Figure 1 illustrates a representative workstation hardware environment in which the present invention may be practiced;

Figure 2 illustrates a data processing network in which the present invention may be practiced;

Figure 3 is a block diagram of an exemplary embodiment of a system constructed in accordance with the present invention;

Figure 4 is a flowchart illustrating the steps of the method of the present invention;
and

Figure 5 is a flowchart illustrating a process involved in evaluating wait-list requests and placing them in order in accordance with the present invention.

Detailed Description of the Preferred Embodiments

In the following detailed description of the preferred embodiments, references made to the accompanying drawings which form a part hereof, and in which is shown by way of illustration, an embodiment in which the invention may be practiced. It is understood that other embodiments may be utilized, and changes may be made to both that process and the structure without departing from the scope of the present invention.

As used herein, the following terms have the following meanings:

Flight Leg - used in the context of airline travel to describe a single flight segment comprising a take-off from a departure point through the immediately-following landing at a destination point.

Itinerary - the sequential outline of a trip or other sequence of events, or a proposed trip or sequence of events. For example, in the context of airline travel, the term "Itinerary" describes the sequence of flight legs beginning at the originating (i.e., the first) departure point and ending at the ultimate (i.e., final) destination point. An airline travel itinerary can be "one-way" or "roundtrip" using the ordinary and customary meaning of these terms. An itinerary with respect to hotel travel would be the sequence of nightly hotel stays in a particular trip, beginning with the first stay and ending with the last.

Demographic Information - statistical characteristics of a population; in connection with the present invention, the demographic information pertains to statistical characteristics relating to consumers of perishable commodities including, without limitation, the age, gender, national origin, citizenship, country of residence, occupation, annual income, marital status, and frequency of purchase (of the perishable commodity) of the consumer.

Commodity Details - narrow, detailed information pertaining to a commodity; for example, commodity details in connection with an airline seat include, without limitation, carrier name, flight origin, flight destination, booking class, flight distance, departure time, connection time, arrival time, departure date, arrival date, flight duration, number of distinct legs comprising a complete one-way itinerary, aircraft type, aircraft capacity.

Point-of-Sale (POS) Information - statistical information available from the location where the sale of the commodity occurred. This information may include, without limitation, POS type (travel agent, direct sale, etc.), POS country, booking carrier, booking recency, change recency (i.e., how recent a change in the booking was made), fare code, number of passengers traveling with the consumer making the reservations, length of stay associated with the reservation, time between booking date and flight date, payment status.

Materialization Information - statistical information identifying a reservation as having either materialized or not materialized.

Past Reservation Information - commodity details, demographic information, POS information and/or materialization information relating to past reservations for perishable commodities that have already perished. It may also include information regarding the status of a past reservation as having been wait-listed. Upon expiration (perishing) of the commodity, the information pertaining thereto becomes past reservation information because it then relates to reservations that can no longer be filled.

Current Reservation Information - commodity details, demographic information, and/or POS information relating to current (i.e., pending) reservations for perishable commodities. Upon expiration (perishing) of the commodity, the current reservation information becomes past reservation information because it then relates to reservations that can no longer be filled.

Wait-List Reservation Information - commodity details, demographic information, and/or POS information relating to wait-listed reservations for perishable commodities and the individuals corresponding to the wait-listed reservations.

Figure 1 illustrates a representative workstation hardware environment in which the present invention may be practiced. The environment of Figure 1 comprises a representative single user computer workstation 100, such as a personal computer, including related peripheral devices. The workstation 100 includes a microprocessor 112 and a bus 114 employed to connect and enable communication between the microprocessor 112 and the components of the workstation 100 in accordance with known techniques. The

workstation 100 typically includes a user interface adapter 116, which connects the microprocessor 112 via the bus 114 to one or more interface devices, such as keyboard 118, mouse 120, and/or other interface devices 122, which can be any user interface device, such as a touch sensitive screen, digitized entry pad, etc. The bus 114 also connects a display device 124, such as an LCD screen or monitor, to the microprocessor 112 via a display adapter 126. The bus 114 also connects the microprocessor 112 to memory 128 and long term storage 130 which can include a hard drive, tape drive, etc.

The workstation 100 communicates via a communications channel 132 with other computers or networks of computers. The workstation 100 may be associated with such other computers in a local area network (LAN) or a wide area network, or the workstation 100 can be client in a client/server arrangement with another computer, etc. All of these configurations, as well as the appropriate communications hardware and software, are known in the art.

Figure 2 illustrates a data processing network 240 in which the present invention may be practiced. The data processing network 240 includes a plurality of individual networks, including LANs 242 and 244, each of which includes a plurality of individual workstations 100. Alternatively, as those skilled in the art will appreciate, a LAN may comprise a plurality of intelligent workstations coupled to a host processor.

Still referring to Figure 2, the data processing network 240 may also include multiple mainframe computers, such as a mainframe computer 246, which may be

preferably coupled to the LAN 244 by means of a communications link 248. The mainframe computer 246 may be implemented utilizing an Enterprise Systems Architecture/370, or an Enterprise Systems Architecture/390 computer available from the International Business Machines Corporation (IBM). Depending on the application, a midrange computer, such as an Application System/400 (also known as an AS/400) may be employed. "Enterprise Systems Architecture/370" is a trademark of IBM; "Enterprise Systems Architecture/390", "Application System/400" and "AS/400" are registered trademarks of IBM.

The mainframe computer 246 may also be coupled to a storage device 250, which may serve as remote storage for the LAN 244. Similarly, the LAN 244 may be coupled to a communications link 252 through a subsystem control unit/communication controller 254 and a communications link 256 to a gateway server 258. The gateway server 258 is preferably an individual computer or intelligent workstation which serves to link the LAN 242 to the LAN 244.

Those skilled in the art will appreciate that the mainframe computer 246 may be located a great geographic distance from the LAN 244, and similarly, the LAN 244 may be located a substantial distance from the LAN 242. For example, the LAN 242 may be located in California, while the LAN 244 may be located in Texas, and the mainframe computer 246 may be located in New York.

Software programming code which embodies the present invention is typically stored in permanent storage of some type, such as the permanent storage 130 of the workstation 100. In a client/server environment, such software programming code may be stored with storage associated with a server. The software programming code may be embodied on any of a variety of known media for use with a data processing system, such as a diskette, or hard drive, or CD-ROM. The code may be distributed on such media, or may be distributed to users from the memory or storage of one computer system over a network of some type to other computer systems for use by users of such other systems. The techniques and methods for embodying software program code on physical media and/or distributing software code via networks are well known and will not be further discussed herein.

A preferred embodiment of the present invention will now be discussed with reference to Figures 3 - 5.

Figure 3 is a block diagram of an exemplary embodiment of a system constructed in accordance with the present invention. As shown in Figure 3, a data warehouse 300 stores reservation information, both past and current, as well as wait-list reservation information. The reservation information can be directed to data warehouse 300 from any known source, for example, from a reservation system 302 or from external or internal databases 304 and 306. External databases 304 and internal databases 306 are simply "reservoirs" of pertinent data which contain data of interest. Internal databases are kept

by an organization for many purposes, e.g., frequent flyer information and marketing information might be kept in an internal database by an airline. External databases are maintained by private outside sources such as travel agents and data-gathering companies and typically the information they retain is sold to the using organization for profit, e.g., demographic information is often solicited by a private data-gathering organization in exchange for prizes or contest-entries, and the information obtained is then sold to an end user.

The data warehouse 300 may be updated on a real time basis, i.e., as new reservations are made, data regarding the new reservation is immediately stored in the data warehouse 300 so it is immediately available for use in analysis and/or modeling. The new reservation information (e.g., passenger information, flight information, etc. related to a reservation currently being made) is first input to a conventional yield management system 314 via data input 312. Data input 312 can comprise, for example, a keyboard or a server which receives data input from other sources such as the internet, an intranet, or other input source. The yield management system operates in connection with the reservation system 302 in a known manner to confirm (or deny) a reservation request after a determination is made that reservation spaces are (or are not) available taking into account the overbooking criteria established by the yield management system.

Connected between data warehouse 300 and yield management system 314 is a current reservation processor 316 which is capable of two-way communication between

yield management system 314 and data warehouse 300. The data warehouse 300 is queried by current reservation processor 316 to find past reservation information having similar characteristics to the current reservation information.

In accordance with the present invention, a wait-list subprocessor 317 is connected for two-way communication with current reservation processor 316, data warehouse 300, reservation system 302, and yield management system 314. Wait-list subprocessor 317 operates in connection with current reservation processor 316 to store wait-list reservation information pertaining to reservation requests that have been rejected because reservations for the perishable commodity were closed to the reservation request (e.g., based on a decision by yield management system 314). In the preferred embodiment, this information will only be stored in wait-list subprocessor 317 if the party or person attempting to make the rejected reservation indicates a desire to be wait-listed, thereby "weeding out" those who have no desire to be wait-listed.

As described and claimed in commonly assigned copending U.S. Application, "Method and System for Prediction of Materialization of a Reserved Purchase," Serial No. _____, filed concurrently herewith, and incorporated fully herein by reference, current reservation processor 316 examines *all* flights which have similar characteristics to those of the current reservation and determines the likelihood that the current reservation will materialize, processes the reservation through the yield management system 314, and either makes the reservation or rejects it. If the current

reservation request is rejected, in accordance with the present invention, the current reservation information pertaining to the rejected reservation is stored in wait list subprocessor 317 as wait-list reservation information.

Periodically (as often or as seldom as desired), wait-list subprocessor queries data warehouse 300 to find past reservation information having similar characteristics to the wait-list reservation information. In addition to looking at historical data regarding prior flights, wait-list subprocessor 317 may also look at data regarding previous wait-listed reservations that did and did not materialize. Based on this query and analysis of the data retrieved, wait-list subprocessor 317 reorders the wait-listed reservations so that those showing a propensity to materialize are placed on the top of the list and those showing less of a propensity to materialize are placed at the bottom of the list. This can be accomplished, for example, by assigning each wait-listed reservation a score between 0 and 100, with higher numbers being assigned to those more likely to materialize and lower numbers being assigned to those less to materialize, and then putting the wait-listed reservations in chronological order based on their scores. When it comes time to move a reservation from a wait-list status to a reserved status, the reservation with the highest score is selected first, increasing the likelihood that the reservation, formerly wait-listed, will materialize.

Using the present invention, the data warehouse 300 is searched for *all* previous reservations having the same attributes as the wait-listed reservations, and the

materialization information for these past reservations is evaluated. Based on this information, if it is determined that reservations of a particular type have a 98% materialization rate, this factor is applied to the wait list, and if, at the time a reservation becomes available, there are no wait-listed reservations that have a higher materialization percentage, then that wait-listed reservation is transferred to reserved status.

Thus, in accordance with the present invention, each reservation stored in the wait list will be weighted based on its tendency to materialize, and a much more accurate booking will result when a reservation becomes available.

Figure 4 is a flowchart illustrating the basic steps of the method of the present invention. At step 400 information regarding a current reservation request is input to the current reservation processor 316 via the yield management system 314. The information regarding the current reservation request will include the basic information given by a potential purchaser: travel date(s) and time(s); number of passengers; age categories of passengers (e.g., under 12, senior citizen, etc.); gender of passengers; departure and destination location(s); type of travel (e.g., business); payment details. Based on this information, the reservation system 302 also supplies additional information to current reservation processor 316 at step 402. This information is derived based upon the current reservation information discussed above. For example, based on the input information by the potential purchaser, the reservation system might indicate to current reservation

processor 316 that Flight 250 from Philadelphia to London will satisfy the travel dates, times, departure and destination locations, etc. requested by the potential purchaser.

At block 404, the current reservation processor queries the data warehouse 300 to obtain materialization data regarding previous reservations made which possess data characteristics similar to those of the current reservation request. At block 405, based upon the comparison of the past materialization data from the data warehouse 300 and the current reservation information input at step 400, the probability of materialization for the current reservation request is determined and stored in the current transaction processor 316. At step 406, the stored information regarding the materialization probability of the current reservation request is input to the yield management system 314, which utilizes this information to authorize or deny the reservation of desired flight or flights requested by the potential purchaser.

If, at step 406, the yield management system 314 determines that the current reservation request warrants authorization of a reservation, at step 407 a determination is made as to whether or not reservations are still open for the requested commodity. If reservations are open, at step 408 the current reservation request is booked. If, however, at step 407 it is determined that reservations are closed, at step 409 a determination is made as to whether or not the customer desires to be wait-listed. If the customer does not wish to be wait-listed, at step 410 the process ends. If, however, at step 409 the customer

indicates a desire to be wait-listed, at step 411 the current reservation request is moved to the wait-list and stored there as a wait-list request.

Figure 5 illustrates a process involved in evaluating wait-list requests and placing them in order based upon their likelihood of materialization. As noted above, the process steps described with respect to Figure 5 can be performed as often or as seldom as desired. From a practical standpoint, it is most sensible to perform these process steps as close as possible to the point in time at which a decision is made to move wait-listed reservations to a reserved status so that the most current historical data can be applied to the wait-list. For example, with respect to airline reservations, it may be desirable to update the wait-list seven days prior to departure, since it is frequent that an airline will consider reservations which have not been paid for by this date to expire, thereby leaving room for wait-listed persons to move onto the reserve list.

Referring to Figure 5, at step 500, information regarding the next wait-listed reservation request is designated for analysis by wait-list processor 317. At step 502, wait-list processor 317 queries the data warehouse 300 to obtain materialization data regarding all previous reservations having characteristics similar to those of the designated wait-listed reservation.

At step 504, the past reservation data is analyzed to determine the probability of materialization of the designated reservation request. Based on this analysis, at step 505 the designated wait-listed reservation is assigned a promotion probability score, e.g., a

number between 0 and 1, based on its probability of materialization. If desired, to "score" more profitable reservations with a higher value (so that, for example, a more profitable, non-discounted fare reservation is selected for promotion before a less profitable, discounted fare reservation), the revenue value of all fares in the wait list can be multiplied by the promotion probability score so that the revenue value is taken into account.

At step 506, a determination is made as to whether there are additional wait list reservations to analyze. If the answer is affirmative, the process proceeds back to step 500 and analysis of the next wait-listed reservation begins. If there are no additional wait-list reservations to process, at step 507 the wait-list is reordered so that those wait-list reservations having the highest probability of materializing are placed at the top of the wait-list. This information is input to the yield management system 314 where it is then processed identical to other reservation requests.

Use of the present invention results in much greater precision in materialization forecasting than the methods and systems of the prior art. By focusing on and analyzing the individual details which cause a reservation to materialize or not materialize, the accuracy of materialization forecasting is improved and the efficiency of wait list promotion is increased significantly.

While the present invention can be used at any time and as often or as little as desired, additional benefits can be obtained by utilizing the invention at certain critical times in a reservation cycle prior to the perishing date. For example, in connection with

airline reservations, it can be helpful to update the wait-list several times prior to the materialization departure, e.g., at departure plus 21 days, departure plus 14 days, departure plus 7 days, departure plus 4 days, etc. Having this updated information might allow the airline to make adjustments as needed, such as by discounting fares to make sure reservations that became unmaterialized at the last minute can be sold or by adding additional flights to a schedule if warranted.

Although the present invention has been described with respect to a specific preferred embodiment thereof, various changes and modifications may be suggested to one skilled in the art and it is intended that the present invention encompass such changes and modifications as fall within the scope of the appended claims. For instance, the example described above is directed primarily to an airline reservations system; however, it is understood that the present invention has equal application and the claims herein are intended to cover to any reservation system involving transactions related to perishable commodities. Further, while certain examples of characteristics and traits of the reservations and perishable commodities are given herein, it is not intended to limit the present invention to the gathering and analysis of these characteristics and traits; any characteristics and traits of the perishable commodities may be utilized in connection with the present invention. The programming of the present invention may be implemented by one of ordinary skill in the art of object-oriented programming.

The above-described materialization prediction system and its individually described elements may be implemented in various computing environments. For example, the present invention may be implemented on a conventional IBM PC or equivalent, multi-nodal system (e.g., LAN) or networking system. All programming, algorithms, GUIs, display panels and dialog box templates, metadata and data related thereto are stored in computer memory, static or dynamic, and may be retrieved by the user in any of: conventional computer storage, display (i.e., CRT) and/or hardcopy (i.e., printed) formats.

CLAIMS

We claim:

1 1. A method for materialization forecasting with respect to wait-listed
2 reservations made by persons for the potential purchase of perishable commodities,
3 comprising the steps of:

4 gathering past reservation information relating to past reservations for perishable
5 commodities that have already perished;

6 gathering wait list reservation information relating to wait-listed reservations for
7 perishable commodities that have not yet perished;

8 comparing said past reservation information and said wait list reservation
9 information;

10 calculating, based on said comparison, the likelihood that said wait-listed
11 reservations will materialize if promoted to reserved status;

12 ordering said wait-listed reservations based on their likelihood of materialization;
13 and

14 outputting said ordered wait-listed reservations.

1 2. The method as set forth in claim 1, wherein said past reservation information
2 includes historical commodity details regarding said past reservations.

1 3. The method as set forth in claim 2, wherein said past reservation information
2 further includes Point-of-Sale (POS) information pertaining to said past reservations.

1 4. The method as set forth in claim 3, wherein said past reservation information
2 further includes materialization information regarding said past reservations.

1 5. The method as set forth in claim 4, wherein said past reservation information
2 includes demographic information about persons who made said past reservations.

1 6. The method as set forth in claim 5, wherein said demographic information
2 includes one or more of the following pertaining to said persons making said past
3 reservations: age, sex, national origin, citizenship, country of residence, occupation,
4 education, annual income, marital status, reservation frequency.

1 7. The method as set forth in claim 6, wherein said wait list information further
2 includes wait-list commodity details regarding said wait-listed reservations.

1 8. The method as set forth in claim 7, wherein said wait list information further
2 includes POS information pertaining to said wait-listed reservations.

1 9. The method as set forth in claim 8, wherein said wait list information includes
2 demographic information about persons making said wait-listed reservations.

1 10. The method as set forth in claim 9, wherein said demographic information
2 includes one or more of the following pertaining to said persons making said wait-listed
3 reservations: age, sex, national origin, citizenship, country of residence, occupation,
4 education, annual income, marital status, reservation frequency.

1 11. The method as set forth in claim 10, wherein said perishable commodity
2 comprises airline seats, and wherein said historical commodity details include information
3 related to one or more of the following regarding said airline seats: carrier name, flight
4 origin, flight destination, booking class, flight distance, departure time, connection time,
5 arrival time, departure date, arrival date, flight duration, number of distinct legs
6 comprising a complete one-way itinerary, aircraft type, aircraft capacity.

1 12. The method as set forth in claim 11, wherein said POS information includes
2 one or more of the following: POS type, POS country, booking carrier, booking recency,
3 change recency, fare code, number of passengers traveling with said individuals making

4 said past reservations, length of stay associated with the reservation, time between booking
5 date and flight date, payment status.

1 13. The method as set forth in claim 12, wherein said wait-list commodity details
2 include information related to one or more of the following: carrier name, flight origin,
3 flight destination, booking class, flight distance, departure time, connection time, arrival
4 time, departure date, arrival date, flight duration, number of distinct legs comprising a
5 complete one-way itinerary, aircraft type, aircraft capacity.

1 14. Computer-readable code stored on media for conducting materialization
2 forecasting with respect to wait-listed reservations made by persons for the potential
3 purchase of perishable commodities, comprising:

4 first subprocesses for gathering past reservation information relating to past
5 reservations for perishable commodities that have already perished;

6 second subprocesses for gathering wait list reservation information relating to wait-
7 listed reservations for perishable commodities that have not yet perished;

8 third subprocesses for comparing said past reservation information and said wait list
9 reservation information;

10 fourth subprocesses for calculating, based on said comparison, the likelihood that
11 said wait-listed reservations will materialize if promoted to reserved status;

12 fifth subprocesses for ordering said wait-listed reservations based on their likelihood
13 of materialization; and

14 sixth subprocesses for outputting said ordered wait-listed reservations.

1 15. The computer-readable code as set forth in claim 14, wherein said past
2 reservation information includes historical commodity details regarding said past
3 reservations.

1 16. The computer-readable code as set forth in claim 15, wherein said past
2 reservation information further includes Point-of-Sale (POS) information pertaining to said
3 past reservations.

1 17. The computer-readable code as set forth in claim 16, wherein said past
2 reservation information further includes materialization information regarding said past
3 reservations.

1 18. The computer-readable code as set forth in claim 17, wherein said past
2 reservation information includes demographic information about individuals who made said
3 past reservations.

1 19. The computer-readable code as set forth in claim 18, wherein said demographic
2 information includes one or more of the following pertaining to said persons making said
3 past reservations: age, sex, national origin, citizenship, country of residence, occupation,
4 education, annual income, marital status, reservation frequency.

1 20. The computer-readable code as set forth in claim 19, wherein said wait list
2 information further includes wait-list commodity details regarding said wait-listed
3 reservations.

1 21. The computer-readable code as set forth in claim 20, wherein said wait list
2 information further includes POS information pertaining to said wait-listed reservations.

1 22. The computer-readable code as set forth in claim 21, wherein said wait list
2 information includes demographic information about persons making said wait-listed
3 reservations.

1 23. The computer-readable code as set forth in claim 22, wherein said demographic
2 information includes one or more of the following pertaining to said persons making said
3 wait-listed reservations: age, sex, national origin, citizenship, country of residence,
4 occupation, education, annual income, marital status, reservation frequency.

1 24. The computer-readable code as set forth in claim 23, wherein said perishable
2 commodity comprises airline seats, and wherein said historical commodity details include
3 information related to one or more of the following regarding said airline seats: carrier
4 name, flight origin, flight destination, booking class, flight distance, departure time,
5 connection time, arrival time, departure date, arrival date, flight duration, number of
6 distinct legs comprising a complete one-way itinerary, aircraft type, aircraft capacity.

1 25. The computer-readable code as set forth in claim 24, wherein said POS
2 information includes one or more of the following: POS type, POS country, booking
3 carrier, booking recency, change recency, fare code, number of passengers traveling with
4 said persons making said past reservations, length of stay associated with the reservation,
5 time between booking date and flight date, payment status.

1 26. The computer-readable code as set forth in claim 25, wherein said perishable
2 commodity comprises airline seats, and wherein said wait-list commodity details include
3 information related to one or more of the following: carrier name, flight origin, flight
4 destination, booking class, flight distance, departure time, connection time, arrival time,
5 departure date, arrival date, flight duration, number of distinct legs comprising a complete
6 one-way itinerary, aircraft type, aircraft capacity.

1 27. A method for materialization forecasting with respect to wait-listed
2 reservations made by persons for the potential purchase of perishable commodities,
3 comprising the steps of:

4 gathering past reservation information relating to past reservations for perishable
5 commodities that have already perished;

6 gathering wait list reservation information relating to wait-listed reservations for
7 perishable commodities that have not yet perished;

8 comparing said past reservation information and said wait list reservation
9 information;

10 calculating, based on said comparison, the likelihood that said wait-listed
11 reservations will materialize if promoted to reserved status;

12 determining the revenue value of each of said wait-listed reservations;

13 ordering said wait-listed reservations based on a combination of their likelihood of
14 materialization and their revenue value; and

15 outputting said ordered wait-listed reservations.

Abstract

The present invention provides a system and method for predicting the likelihood of materialization of pending wait-listed reservations for the purchase of perishable commodities. Details pertaining to perishable commodities for which reservations for purchase have been made in the past, are gathered and analyzed as are details pertaining to reservation requests stored in a wait list. Based upon the analysis, the likelihood that a particular pending reservation will actually be purchased or "materialize" if it is taken off the wait-list and actually reserved is determined and this information is utilized for yield management.

M:\MSimpson\IBM\24241\Pat. Off\Spec

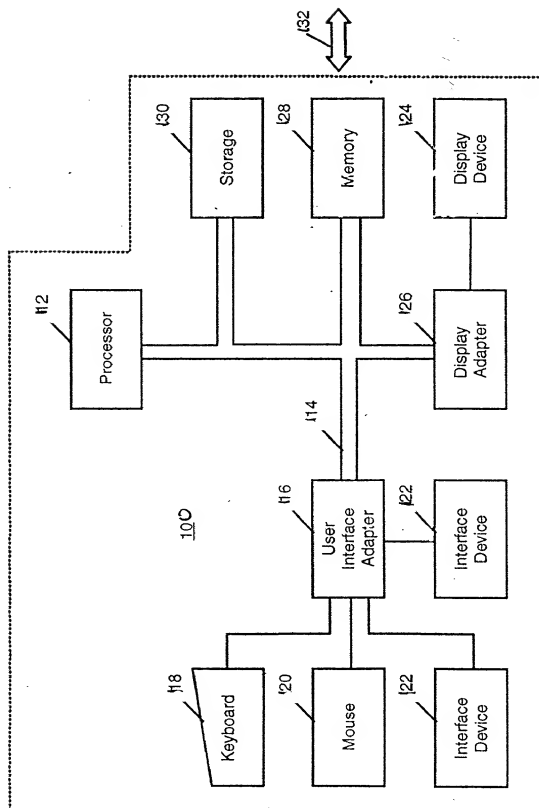


FIG. 1

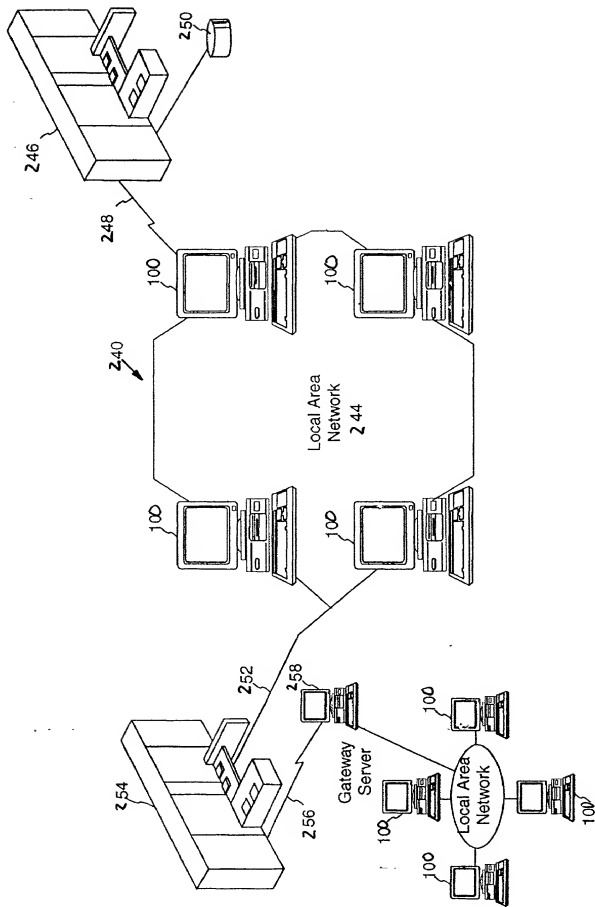


FIG. 2

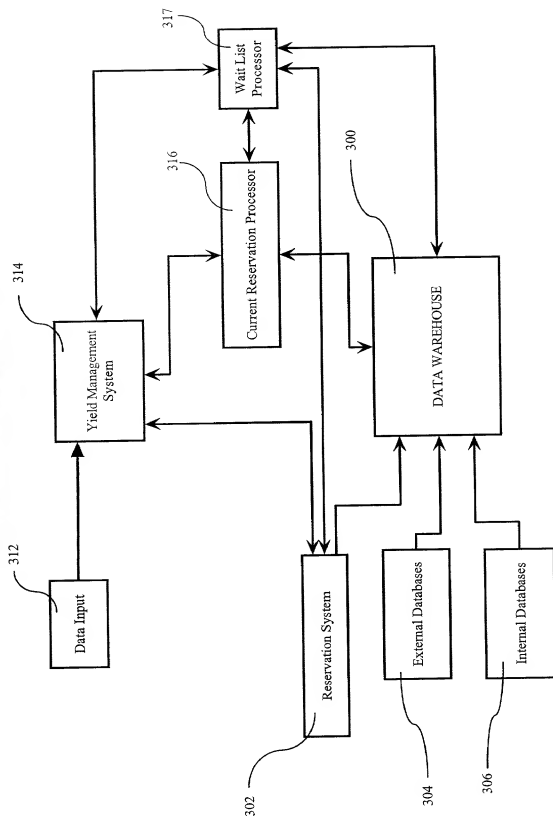
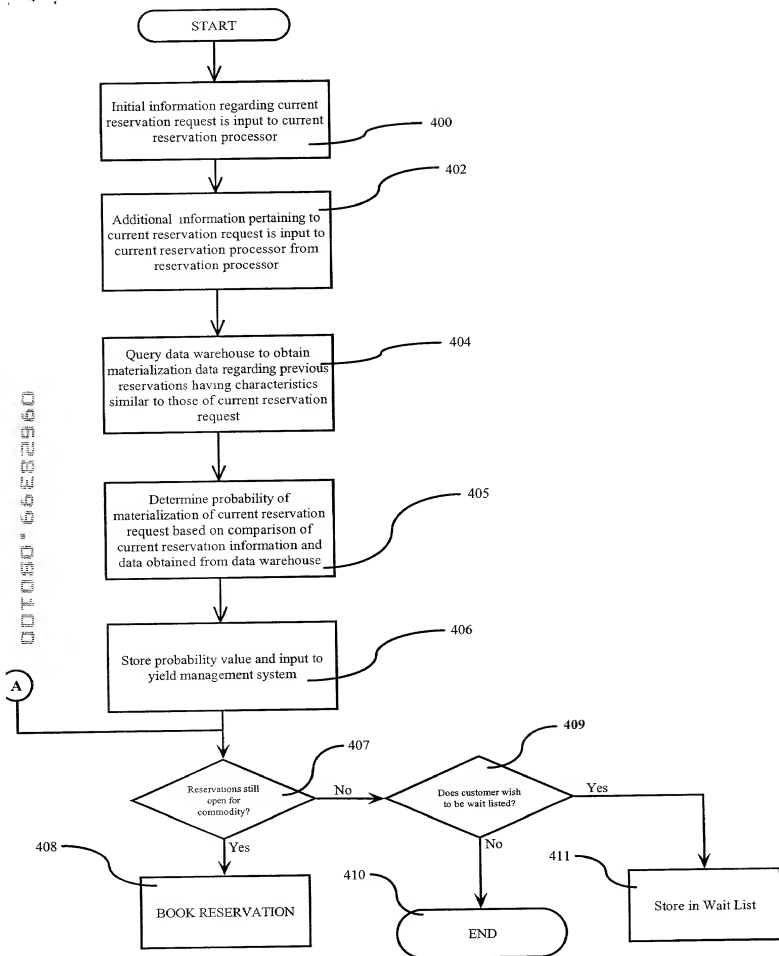


Fig. 3



START

Information regarding next wait-listed reservation request is designated for analysis by wait list processor

500

Query data warehouse to obtain materialization data regarding previous reservations having characteristics similar to those of designated wait listed reservation

502

Determine probability of materialization of designated reservation request based on comparison with data obtained from data warehouse

504

505

Assign designated wait listed reservation a promotion score based on probability of materialization

506

YES

Another Wait List Reservation to process?

NO

Reorder Wait List Based on Scores

507

A

Fig. 5

**Declaration and Power of Attorney for
Patent Application**

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name; I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**METHOD AND SYSTEM FOR MANAGEMENT
OF A WAIT LIST FOR RESERVED PURCHASES**

the specification of which:

☒ is attached hereto.

☐ was filed on _____ as Application Serial No. _____ and was amended on _____.

I hereby state that I have reviewed and understand the contents of the above- identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s):

Number

Country

Day/Month/Year

Priority Claimed

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose information material to the patentability of this application as defined in Title 37, Code of Federal Regulations, §1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

Prior U.S. Applications:
Serial No. _____

Filing Date _____

Status _____

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

As a named inventor, I hereby appoint the following attorneys and/or agents to prosecute this application and transact all business in the Patent and Trademark Office connected therewith:

A. B. Clay	Reg. No. 32,121
G. M. Doudnikoff	Reg. No. 32,847
E. H. Duffield	Reg. No. 25,970
J. W. Herndon	Reg. No. 27,901
J. S. Ray-Yarletts	Reg. No. 39,808.
John T. Synnestvedt	Reg. No. 18,117
Charles H. Lindrooth	Reg. No. 20,659
Irving Newman	Reg. No. 22,638
Alexis Barron	Reg. No. 22,702
Peter J. Butch, III	Reg. No. 32,203
Joseph F. Posillico	Reg. No. 32,290
Mark D. Simpson	Reg. No. 32,942
Theodore Naccarella	Reg. No. 33,023
Patrick J. Kelly, Ph.D.	Reg. No. 34,638
Gary A. Hecht	Reg. No. 36,826
Stephen J. Driscoll	Reg. No. 37,564
Lisa B. Lane	Reg. No. 38,217
Joshua R. Slavitt	Reg. No. 40,816
John A. Chionchio	Reg. No. 40,954
Gregory S. Bernabeo	Reg. No. 44,032
Stephen J. Weed	Reg. No. 45,202

Send all correspondence to:

Mark D. Simpson, Esquire
Synnestvedt & Lechner LLP
2600 Aramark Tower
1101 Market Street
Philadelphia, PA 19107-2950

Telephone: (215) 923-4466
Facsimile: (215) 923-2189

PATENT

Attorney Docket No. RSW9-2000-0094-US

Inventor: **David A. Selby**

Signature: 

Date: *24th* *5/20/00*

Residence: Dunwoody, Southwick Road, North Boarhunt Near Fareham,
Hampshire PO17 6JW ENGLAND

Citizenship: British

Post Office Address: Same as residence

M:\MSimpson\IBM\24241\Pat Off\declaration